Book review

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Rogers, L.J. (1995). The development of brain and behaviour in the chicken. Wallingford: CAB International. Pp. ix + 273. ISBN 0–85198–924–1. £45.00 (Hbk).

Books on behavioural development and neural plasticity are generally concerned with mammals, particularly primates and rodents. A volume edited by Andrew (1991) made clear, however, that the domestic chick can be used with great success in this field of research. Despite its apparent importance, much of this work is still relatively unknown to a wider range of researchers. The present volume demonstrates that not only does the chicken represent an interesting species to study in its own right, but research on chicks may also provide valuable insights into broad issues of development in other species, including mammals. As Rogers puts it: "In each case the findings in birds have been either generally applicable to mammalian species or they have led to advances in knowledge of the mammalian brain by their difference" (p. 211).

The first two of the book's seven chapters provide a systematic description of the development of brain and behaviour before hatching, mainly concerned with the development of sensory systems. Special emphasis is placed on the interplay between genetic factors and environmental influences. In fact, one of the messages in this book is the essential importance of this very interplay throughout the course of development, both before and after hatching. Despite persistent attempts to qualify behaviour as either learned or innate, or to quantify the degree to which a behavioural trait is determined by either, the present volume demonstrates once again that such attempts are futile.

The third chapter addresses early learning after hatching—in particular, learning to recognize mother and siblings (filial imprinting) and learning to recognize food. It becomes apparent that Rogers has a particular interest in the functional lateralization of the cerebral hemispheres, a field in which she is an expert. Recent studies are reported that show that olfaction plays an important role in feeding of chicks and perhaps even in imprinting. Although the most important features of imprinting and passive-avoidance learning are dealt with adequately, not much insight is provided into the learning mechanisms involved. An issue in the behavioural development of the chick that is not discussed, but perhaps should have been, is dustbathing. Chicks learn about the substrate they are allowed to dustbathe in and develop a stable preference for this substrate. Dustbathing is considered to be important with respect to welfare issues (p. 219, 221), and treatment of dustbathing would have been particularly interesting in the light of the search for general principles of behavioural development (Hogan, 1994).

The following chapter deals with brain development after hatching and illustrates that the chick is an excellent model for studying the cellular and molecular correlates of memory. Lateralization of brain function again features heavily. Some problems are discussed concerning the use of pharmacological agents in studying the biological basis of memory formation using even simple learning tasks. All those using such an approach should take notice of these concerns.

The title of the book refers to the "chicken" and thereby suggests that development is covered until adulthood. Nothing is actually wrong with the use of "chicken" to indicate the species under investigation, but I wonder whether the use of "chick" would not have been a better choice. Indeed, Rogers' chicken does not develop much beyond the age of two weeks. Chapter five is concerned

with behavioural transitions from hatching until this age and shows that developmental changes may sometimes be abrupt rather than gradual. Some of the transitions are correlated with changes in the dominance of one hemisphere over the other, but the functional relevance of this is not made clear. The discussion of the development of sexual behaviour focuses on the effects of testosterone, but considerably more could have been said about this matter (Kruijt, 1964). Despite these shortcomings, the data presented in this chapter are interesting and often intriguing.

The generality of the previously discussed findings is examined in a chapter comparing the chicken to other species. The main conclusion is that lateralization is also a characteristic of the brain of other avian as well as mammalian species. Although lateralization takes a prominent position in this volume, one might have expected more from this particular chapter. It is rather disappointing, for instance, not to find a comparison with the development of attachment or food recognition in mammals.

The title of the final chapter—"Can a brain be domesticated?"—does not cover its contents, and the relevance of the chapter to the central theme of the book is unclear. However, examples of cognitive abilities of birds are discussed which are of interest to psychologists working on discrimination learning. Rogers hopes to persuade her readers to pay more attention to the welfare of the chicken, partly because "birds have cognitive capacities equivalent to those of mammals, even primates" (p. 217). However, I am afraid that the most persuasive argument to this end is the one presented a few pages later: "commercial profits increase with apparently improved welfare of the chicken".

The items covered in this book are dealt with in a systematic fashion and as thoroughly as one might hope for. Experimental psychologists should not expect new insights into the mechanisms of learning and memory, but the book will provide a comprehensive reference database not only for those using the chicken as an experimental subject, but also for those with a general interest in the early development of brain and behaviour. The volume illustrates that the chick has become an important subject in this field of research.

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